Service Instructions

Automatic Vibration Exciter Control

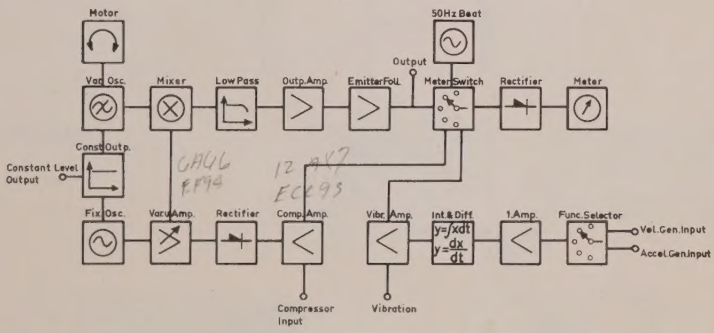
Consisting of:

Output Amplifier	1025.1
Oscillator	1025.2
Constant Level Circuit	1025.3
Pick-up Amplifier	1025.4
Compressor	1025.5
Motor Drive Circuits	1025.6
Position of Components	1025.7
Parts List	1025.8
Circuit Diagram	1025.9

Removal of the Case.

After removing the eight HEX/HD screws on the front panel and the two screws in the bottom, it is possible to slide the chassis and the front panel out of the wooden case.

For rack mounting the metal case can be pulled out after the six HEX/HD screws on the side of the instrument are removed.



Trouble Shooting.

If the reason for a fault is not an obvious one such as a dead tube or transistor, broken down resistor, blown or disconnected fuse etc., then first test the voltages of all the tubes and compare them with the voltages shown in the circuit diagram in order to localize the defect. Should this method of finding the fault prove unsuccessful, then check the instrument by adopting the method described in the adjustment procedure. When the trouble has been found and remedied, the voltages and adjustment which are influenced by the remedy must be rechecked.

The tolerances stated in the instructions can only be used as a guide for adjustment and control, but any deviations must not be corrected without being sure that the tolerances of the instruments used for making the adjustment are so small as to have no influence on the measurements.

The instructions in this Manual are given purely as a guide to the service of equipment with minor faults. Some faults, as f.inst. small deviations in tolerances require for their correction special control equipment and extensive experience, and in these cases it is necessary to send the instrument to the factory.

Spare Parts.

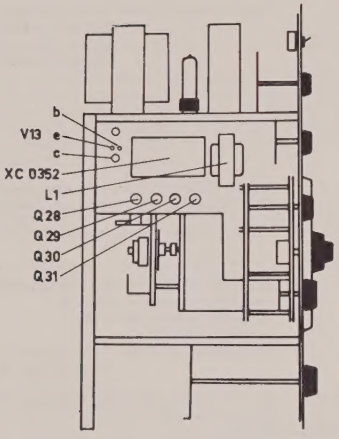
Please state type and serial number of apparatus when spare parts are ordered.

Instruments Necessary for Service and Repair:

Frequency Analyzer type 2107
Oscilloscope
Frequency Counter
Multimeter (50 µA)

Output Amplifier

valid from serial no. 185806

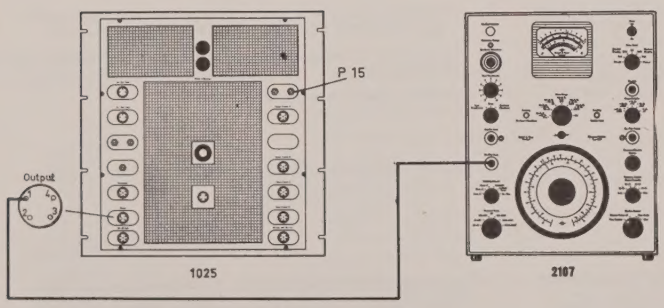


1.1. DC. Voltages.

V 13	Collector	- 10 V
	Emitter-base	- 0,5 V
	Emitter	- 6,2 V
V 17	Base	- 7 V

V 15	Collector	240 V
	Emitter-base	0,5 V
	Emitter	155 V
V 16	Emitter-base	0,5 V
	Emitter	82 V

V 17 located on printed circuit XC 0352
V 15,16 " " " XC 0340.



1.2. Calibration of Indicating Meter.

METER SWITCH: "Output Voltage"
SCANNING SWITCH: "Off"
FREQUENCY RANGE: "5-5000 Hz"
COMPRESSOR SPEED: "Off"
OUTPUT SWITCH: "Linear"
FREQUENCY SCALE: "400 Hz"

Scanning Off

Adjust the OUTPUT VOLTAGE for 10 V on OUTPUT socket.
Deflection on type 1025: 10 V.
If necessary adjust P 15.

continued

1.3. Output Voltage.

METER SWITCH: "Output Voltage"
SCANNING SWITCH: "Off"
COMPRESSOR SPEED: "Off"
OUTPUT SWITCH: "Linear"
OUTPUT VOLTAGE: "10"

Check that full scale deflection on type 1025 can be obtained in the entire frequency range from 5–10000 Hz.

Possible reason for fault: The blocking range of the cam. discs on the rear side of CV 0009 is within the frequency range.
Too low LF-signal to output amplifier check item 2.3.
Too low DC voltage on V 10 cathode.

1.4. Frequency Response.

a. METER SWITCH: "Power Freq. Beat"
SCANNING SWITCH: "Off"
FREQUENCY RANGE: "5–5000 Hz"
COMPRESSOR SPEED: "Off"
OUTPUT SWITCH: "Linear"

Set the FREQUENCY SCALE exactly to the mains frequency and adjust FREQUENCY SCALE ADJ. until a very slow beat shows up.

b. METER SWITCH: "Output Voltage"
FREQUENCY SCALE: "400 Hz"

Adjust the OUTPUT VOLTAGE for an 18 dB deflection on type 1025.
Vary the frequency from 5–5000 Hz.
Deflection on type 1025: 18 dB.
Tolerance: ± 0,5 dB.
Possible reasons for fault: Defective tube V 8
Defective filter Z 3,4.

c. FREQUENCY RANGE to "5005–10000 Hz"

Vary the frequency from 5005–10000 Hz.
Deflection on type 1025: 18 dB.
Tolerance: ± 1 dB.

d. FREQUENCY RANGE to "5–5000 Hz"
OUTPUT SWITCH to "High Pass"
FREQUENCY SCALE to "400 Hz"

Adjust the OUTPUT VOLTAGE for a 20 dB deflection on type 1025.
Change frequency to 100 Hz.
Deflection on type 1025: 19,7 dB.
Tolerance: ± 0,2 dB.
Change frequency to 5 Hz.
Deflection on type 1025: 4 dB.
Tolerance: ± 2 dB.

2 DB

1.5. Noise.

a. METER SWITCH: "Output Voltage"
SCANNING SWITCH: "Off"
FREQUENCY RANGE: "5–5000 Hz"
COMPRESSOR SPEED: "Off"
OUTPUT SWITCH: "Linear"
FREQUENCY SCALE: "400 Hz"

Place the instrument in its case or screen it effectively in another way.
Adjust the OUTPUT VOLTAGE for a 10 V deflection on type 2107.

Remove tube V 7 and measure the noise from the output amplifier only: Min. 75 dB below 10 V.

– 83 out of case

Possible reason for fault: Defective tube V 8.

H.P. model 403

V7 installed + Output Voltage (– 79)
Control max CCW

1.6. Distortion.

METER SWITCH: "Output Voltage"
SCANNING SWITCH: "Off"
FREQUENCY RANGE: "5–5000 Hz"
COMPRESSOR SPEED: "Off"
OUTPUT SWITCH: "Linear"

Adjust the OUTPUT VOLTAGE for a 10 V deflection on type 1025.

Check distortion at different frequencies: Max. 0,5%.

Attention: Bear in mind that 2107 only allows measurements of distortion down to around 0,5% without a filter type 1607 connected between type 1025 and 2107 for rejection of the fundamental frequency.

Possible reason for fault: Defective tube V 7,8.

@ 300 mV output distortion < .25 % 10HZ - 10KHZ
10HZ = < .3 %
100HZ = < .3 %
1KHZ = < .3 %
3KHZ = < .3 %
. 3 % 5 - 10HZ

Removal of Tuning Capacitor CV 0009.

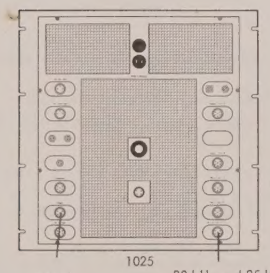
Remove the right hand side cover (when seen from the instrument front plate) of the capacitor unit CV 0009.

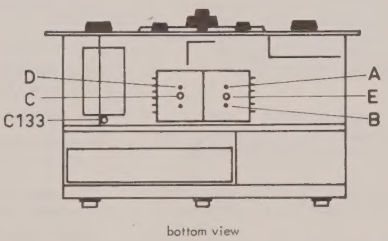
Set the condenser to fully "turned in" position. The position of the condenser is checked with a plate of insulating material, which strokes over the stator plates, so that none of the rotor plates is above the stator plates. The scale pointer should now point at 220°. If not, note carefully the position of the pointer. Remove the multi-plugs and unsolder the two leads to the oscillator coil assembly. Unscrew the two knobs on the tuning spindle and remove the scale rim. Draw a circle on the front plate closely following the frequency scale for centering purpose of frequency scale. Remove pointer and scale. The four screws, which secure Tuning Capacitor CV 0009 to the front plate, can then be unscrewed.

Replacing Tuning Capacitor CV 0009.

After replacing scale, center it with reference to the drawed circle on the front plate. Check the position of the condenser with a plate of insulating material for fully interleaved capacitor plates and fix the pointer to 220° or to the position noted above.

Attention: Item 2.1. and 2.2. The frequency can only be checked by means of a frequency counter or a frequency standard and an oscilloscope. The voltage should be measured by means of a high impedance (low capacity) tube voltmeter.





bottom view

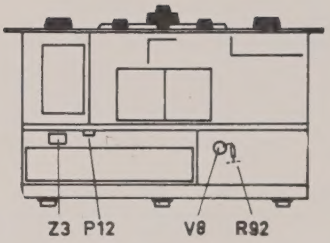
2.1. Fixed Oscillator.

a. FREQUENCY RANGE: "5005-10000 Hz"	Check the signal on the socket "30 kHz and 35 kHz" (pin 4). The frequency should be 35 kHz. If necessary adjust the iron core "C" in Z 2. The voltage should be approx. 2.7 V.
b. FREQUENCY RANGE to "5-5000 Hz"	The frequency should change to 30 kHz. If not, adjust the air trimmer "D" in Z 2 and check item a again.
c. METER SWITCH: "Output Voltage" SCANNING SWITCH: "Off" FREQUENCY RANGE: "5-5000 Hz" COMPRESSOR SPEED: "Off" OUTPUT SWITCH: "Linear" FREQUENCY SCALE: "10 Hz"	Check that the frequency at the "Output" socket is 10 Hz ± 0,5%. If not, check items 2.1.b. and 2.2. Turn FREQUENCY RANGE to 0-5000 Hz. Check the frequency on the "Output" socket: 5 Hz ± 0,5%. If necessary adjust C 133.

2.2. Variable Oscillator.

a. METER SWITCH: "Output Voltage" SCANNING SWITCH: "Off" FREQUENCY RANGE: "5-5000 Hz" COMPRESSOR SPEED: "Off" OUTPUT SWITCH: "Linear" FREQUENCY SCALE: "5 Hz"	Check that the frequency on the "Output" socket (pin 1) is 5 Hz. If not, adjust the FREQUENCY SCALE ADJUSTMENT. Fine adjustment by a knob and coarse adjustment by a screwdriver operated capacitor. In case that the regulation range is too far away set both variable trimmers in mid position and adjust the air trimmer "B" in Z 2 for 5 Hz.
b. FREQUENCY SCALE to "5000 Hz"	Check that the frequency is 5000 Hz. If not, adjust the iron core "E" in Z 2 and check item a again.

continued



bottom view

2.3. Oscillator Voltage.

a. METER SWITCH: "Output Voltage"
SCANNING SWITCH: "Off"
FREQUENCY RANGE: "5005-10000 Hz"
COMPRESSOR SPEED: "Off"
OUTPUT SWITCH: "Linear"

Adjust the OUTPUT VOLTAGE for an approx. half scale deflection on type 1025.

Adjust the iron core in Z 3 to max. deflection on type 1025.

When FREQUENCY RANGE is changed to "5-5000 Hz" the deflection must change max. 1 dB.

b. COMPRESSOR SPEED to "Off"
FREQUENCY RANGE to "5-5000 Hz"
FREQUENCY SCALE to "5000 Hz"

Turn "Phase" (P 12) on the front plate to min. deflection on type 1025.

Check the voltage across R 92: 320 mV.
If necessary adjust P 3 situated on printed circuit XC 0349.

c. FREQUENCY RANGE to "5005-10000 Hz"
FREQUENCY SCALE to "5005 Hz"

Check again the voltage across R 92: 320 mV.
If necessary adjust P 2 situated on printed circuit XC 0349.

Possible reasons for fault: Defective tube V 5
" filter Z 3
" capacitor C 60

2.4. Frequency Drift.

60 Hz

METER SWITCH: "Power Freq. Beat"
SCANNING SWITCH: "Off"
FREQUENCY RANGE: "5-5000 Hz"
OUTPUT SWITCH: "Linear"

Set the FREQUENCY SCALE exactly to the mains frequency.

Adjust FREQUENCY SCALE ADJUSTMENT for a very slow beat after a warm up time of 5 min.

Check the frequency drift after a period of 20 min. and after 15 hours by adjustment of the FREQUENCY SCALE for a slow beat and read the frequency deviation on the scale.

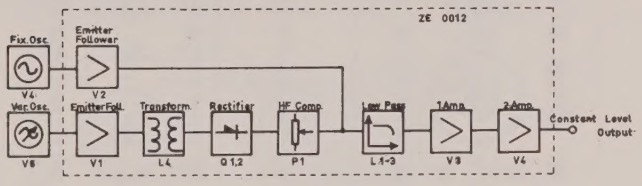
Tolerance: $\pm$ 5 Hz for each period.
If necessary adjust the trimmer "A".

After adjustment check item 2.2.

Attention: If an instrument has not been in use for a long period, frequency drift may occur due to humidity in the oscillator circuit. Therefore keep the instrument switched on 1-2 days before any adjustment.

Constant Level Circuit

valid from serial no. 185806



3.1. Voltages

SCANNING SWITCH: "Off"
FREQUENCY RANGE: "5-5000 Hz"
FREQUENCY SCALE: "1000 Hz"

DC:

V 1 collector	- 6,0 V
emitter	- 2,2 V
emitter-basis	- 0,6 V
V 2 collector	- 6,0 V
emitter	- 2,4 V
emitter-basis	- 0,6 V
V 3 collector	- 5,0 V
emitter	- 0,4 V
emitter-basis	- 0,7 V
V 4 collector	- 2,7 V
emitter	- 5,6 V

AC:

V 1 basis	3,5 V
emitter	2,2 V
V 2 basis	1,0 V
emitter	0,9 V
R 10, C 8	130 mV
V 3 basis	130 mV
collector	230 mV
V 4 collector	1 V

Transistors V 1-4 are located on printed circuit XC 0353.

3.2. HF Balance

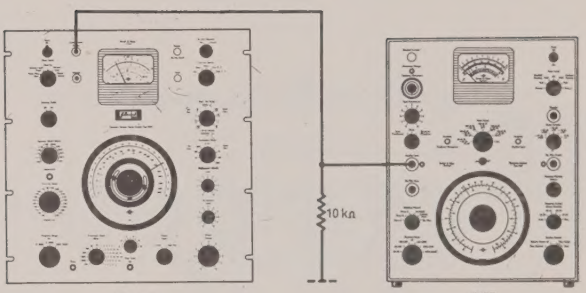
SCANNING SWITCH: "Off"
FREQUENCY RANGE: "5-5000 Hz"
FREQUENCY SCALE: "500 Hz"

Remove V 4.

Connect a Frequency Analyzer type 2107 to R 10, C 8 (located on printed circuit XC 0354).

Max. voltage: 10 mV.
If necessary, adjust P 1 (located on printed circuit XC 0353).

continued



.8 - 1.2

3.3. Output Level and Frequency Response

a. SCANNING SWITCH: "Off"
FREQUENCY RANGE: "5-5000 Hz"
FREQUENCY SCALE: "500 Hz"

Deflection on type 2107: 0,8-1,2 V.

Vary the frequency from 5-5000 Hz and check that the output voltage is constant.

Tolerance: ± 0,5 dB (+ tolerance type 2107: ± 0,3 dB).

MEASURE AUX 7(Hi) 6(Lo) APPROX 1 VOLT

b. FREQUENCY RANGE: "5005-10000 Hz"

Vary the frequency from 5-10000 Hz and check that the output voltage is constant.

Tolerance: ± 1 dB (+ tolerance type 2107: ± 0,3 dB).

3.4. Distortion

a. SCANNING SWITCH: "Off"
FREQUENCY RANGE: "5-5000 Hz"

Measure the distortion at the following frequencies: 5-12-35-350-5000 Hz.

Tolerance: 1% distortion.

b. FREQUENCY RANGE: "5005-10000 Hz"

Measure the distortion at 10 kHz.

Tolerance: 1% distortion.

3.5. Noise

SCANNING SWITCH: "Off"
FREQUENCY RANGE: "5-5000 Hz"
OUTPUT SWITCH: "Linear"

Remove V 4. → 12AT7 OSCILLATOR TUBE

Check the noise measured on type 2107.

Tolerance: 60 dB below 1 V level in the entire frequency range.

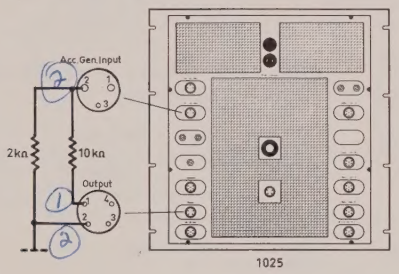
< 70 db

Pick-up Amplifier

1025.4

valid from serial no. 185806

Attention: The pick-up amplifier can only be checked and adjusted by means of a frequency counter or an oscilloscope and a frequency standard. The voltages should be measured by means of a high impedance (low capacity) tube voltmeter.

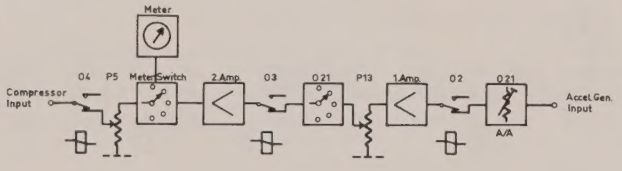


Check of Pick-up Amplifier Using "Accel.Gen.Input"

To check this section set the switches as follows:

METER SWITCH: "Vibration Level"
SCANNING SWITCH: "Off"
COMPRESSOR SWITCH: "Off"
OUTPUT SWITCH: "Linear"

Switches not mentioned here are set in a position according to instructions.



4.1. Frequency Response.

a. FUNCTION SELECTOR: "Accel."
ACCELERATION RANGE: "1" (Acc.Gen.)
FREQUENCY RANGE: "5-5000 Hz"
FREQUENCY SCALE: "500 Hz"

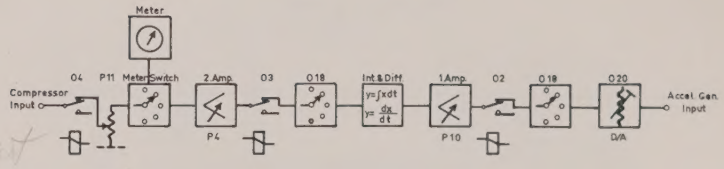
Adjust OUTPUT VOLTAGE for an 18 dB deflection on type 1025.

Change the frequency from 10-5000 Hz.
Deflection on type 1025: 18 dB.
Tolerance: ± 0,5 dB.

b. FREQUENCY RANGE to "5005-10000 Hz"

Check and tolerance as under item a.

continued



4.2. Sensitivity of Displacement

a. FUNCTION SELECTOR: "Displ."
DISPL.-VEL.RANGE: "0,01" (Acc.Gen.)
FREQUENCY RANGE: "5-5000 Hz"
FREQUENCY SCALE: "500 Hz"

Adjust OUTPUT VOLTAGE for an input voltage of exactly 904 mV.

Deflection on type 1025: 20 dB.
Tolerance: ± 0,2 dB.

If necessary, adjust P 10 "Displ./A.G.

AC voltage on V 1 pin 1: 7,8 V
pin 2: 30 mV
pin 6: 700 mV

V 1 is located on printed circuit XC 0126

b. FREQUENCY SCALE to "1000 Hz"

Deflection on type 1025: 8 dB.
Tolerance: ± 0,2 dB.

c. DISPL.-VEL.RANGE to "1" (Acc.Gen.)
FREQUENCY SCALE to "5 Hz"

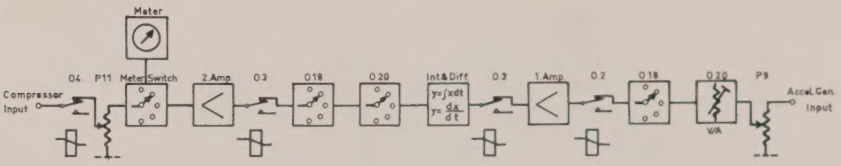
Adjust OUTPUT VOLTAGE for an input voltage of exactly 9,04 mV.

Deflection on type 1025: 19,7 dB.

If necessary, adjust P 4 (located on printed circuit XC 0126).

Possible reason for fault: Defective capacitor C 29, 30.

The sensitivity adjustment of P10 can be set 1,5% higher or lower if it facilities the adjustment of P 4.



4.3. Sensitivity of Velocity

a. FUNCTION SELECTOR: "Vel."
DISPL.-VEL.RANGE: "0,1" (Acc.Gen.)
FREQUENCY RANGE: "5-5000 Hz"
FREQUENCY SCALE: "500 Hz"

Adjust OUTPUT VOLTAGE for an input voltage of exactly 57,6 mV.

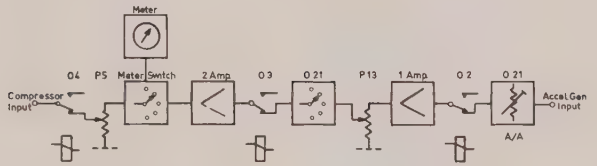
Deflection on type 1025: 20 dB.
Tolerance: ± 0,2 dB.

If necessary, adjust P 9 "Vel./A.G."

AC voltage on V 1 pin 1: 7,8 V
pin 2: 30 mV
pin 6: 700 mV.

b. FREQUENCY SCALE to "1000 Hz"

Deflection on type 1025: 14 dB.
Tolerance: ± 0,2 dB.



4.4. Sensitivity of Acceleration

FUNCTION SELECTOR: "Accel."
ACCELERATION RANGE: "1" (Accel.Gen.)
FREQUENCY RANGE: "5-5000 Hz"
FREQUENCY SCALE: "500 Hz"

Adjust OUTPUT VOLTAGE for an input voltage of exactly 7,07 mV.

Deflection on type 1025: 20 dB.
Tolerance: ± 0,2 dB.

If necessary, adjust P 13 "Accel./A.G."

AC voltage on V 1 pin 1: 1,9 V
pin 2: 7 mV
pin 6: 165 mV

4.5. Check of Acceleration Range

a. FUNCTION SELECTOR: "Accel."
ACCELERATION RANGE: "1" (Accel.Gen.)
FREQUENCY RANGE: "5-5000 Hz"
FREQUENCY SCALE: "500 Hz"

Adjust OUTPUT VOLTAGE to 20 dB deflection on type 1025.

b. ACCELERATION RANGE to "10"(Accel.Gen.)

Deflection on type 1025: 0 dB.
Tolerance: ± 0,4 dB.

Adjust OUTPUT VOLTAGE to 20 dB deflection on type 1025.

c. ACCELERATION RANGE to"100"(Accel.Gen.)

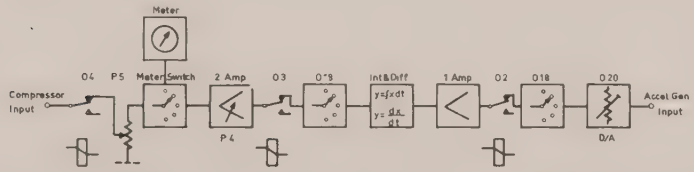
Deflection on type 1025: 0 dB.
Tolerance: ± 0,4 dB.

Adjust OUTPUT VOLTAGE to 20 dB deflection on type 1025.

d. ACCELERATION RANGE to"1000"(Accel.Gen.)

Deflection on type 1025: 0 dB.
Tolerance: ± 0,4 dB.

Check also "Acceleration Range" at 10 kHz.



4.6. Check of Displ.-Vel.Range

a. FUNCTION SELECTOR: "Displ."
DISPL.-Vel.RANGE: "0,01" (Accel.Gen.)
FREQUENCY RANGE: "5-5000 Hz"
FREQUENCY SCALE: "55 Hz"

Adjust OUTPUT VOLTAGE to 20 dB deflection on type 1025.

b. DISPL.-VEL.RANGE to "0,1" (Accel.Gen.)

Deflection on type 1025: 0 dB.
Tolerance: ± 0,4 dB

Adjust OUTPUT VOLTAGE to 20 dB deflection on type 1025

c. DISPL.-VEL.RANGE to "1" (Accel.Gen.)

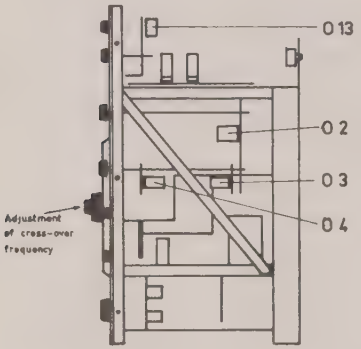
Deflection on type 1025: 0 dB.
Tolerance: ± 0,4 dB

Adjust OUTPUT VOLTAGE to 20 dB deflection on type 1025

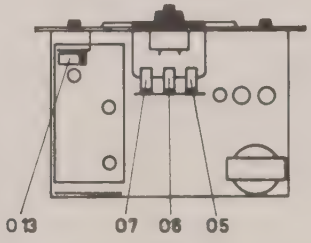
continued

d. DISPL.-VEL.RANGE to "10" (Accel.Gen.) — Deflection on type 1025: 0 dB. Tolerance: ± 0,4 dB.

e. FREQUENCY SCALE to "500 Hz" FUNCTION SELECTOR to "Vel." — Check and tolerances as under item a-d.



right side view



top view

4.7. Relay Functions

a. Check by moving the frequency pointer that the relays O 5-6-7 are energized according to the following table.

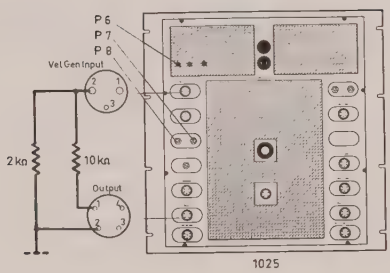
Frequency Scale:	30	100	300 Hz
Relay:	05	05-06	05-06-07

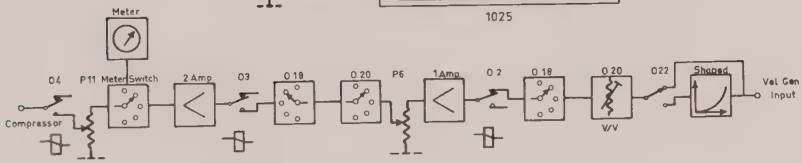
Tolerance: ± 10%.

If necessary loosen rotating contact of switch O 27 (located on the tuning spindel of CV 0009) and adjust the switching point according to table.

b. FUNCTION SELECTOR: "Acc." — Relays O 2-3-4 should energize.

c. FUNCTION SELECTOR to "Auto D-A" — Relays O 2-3-4 and O 13 should energize if the frequency pointer is set to a higher frequency than the cross-over frequency.





Check of Pick-up Amplifier Using "Vel.Gen.Input"

4.8. Frequency Response

a. FUNCTION SELECTOR: "Vel."
DISPL.-VEL.RANGE: "0,01" (Vel.Gen.)
VEL.GEN.RESPONSE: "Flat"
FREQUENCY RANGE: "5-5000 Hz"
FREQUENCY SCALE: "500 Hz"

Adjust the OUTPUT VOLTAGE for a 15 dB deflection on type 1025.

Change the frequency from 5-2000 Hz.

Deflection on type 1025: 15 dB.
Tolerance: ± 0,2 dB.

b. VEL.GEN.RESPONSE to "Shaped"
FREQUENCY SCALE to "10 Hz"

Adjust the OUTPUT VOLTAGE for a 10 dB deflection on type 1025.

Change the frequency from 10-20000 Hz and check the deflection on type 1025.

Frequency Scale	Hz	10	100	200	300	400	500	600
Deflection on type 1025	dB	10	10.26	10.83	11.24	11.63	11.94	12.30
Frequency Scale	Hz	700	800	900	1000	1250	1500	2000
Deflection on type 1025	dB	12.58	12.92	13.15	13.52	14.16	14.80	16.19

Tolerance for frequencies 10-1000 Hz ± 0,3 dB
1250-2000 Hz ± 0,5 dB

4.9. Sensitivity of Velocity

FUNCTION SELECTOR: "Vel."
DISPL.-VEL.RANGE: "0,01" (Vel.Gen.)
VEL.GEN.RESPONSE: "Flat"
FREQUENCY RANGE: "5-5000 Hz"
FREQUENCY SCALE: "500 Hz"

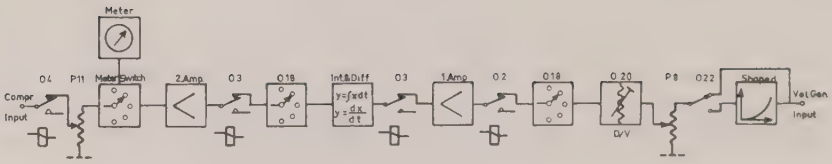
Adjust OUTPUT VOLTAGE for an input voltage of exactly 6.8 mV.

Deflection on type 1025: 20 dB.
Tolerance: ± 0,2 dB.

If necessary adjust P 6 "Vel./V.G."

AC voltage on V 1 pin 1: 450 mV
pin 2: 1,8 mV
pin 6: 45 mV

continued



4.10. Sensitivity of Displacement

a. FUNCTION SELECTOR: "Displ."
DISPL.-VEL.RANGE: "0,01" (Vel.Gen.)
VEL.GEN.RESPONSE: "Flat"
FREQUENCY RANGE: "5-5000 Hz"
FREQUENCY SCALE: "500 Hz"

Adjust the OUTPUT VOLTAGE for an input voltage of exactly 1.07 V.

Deflection on type 1025: 20 dB.
Tolerance: ± 0,2 dB.

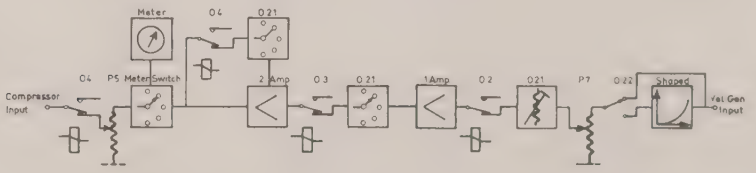
If necessary adjust P 8 "Displ./V.G."

After adjustment of P 8 check item 4.11.

AC voltage on V 1 pin 1: 7,6 V
pin 2: 28 mV
pin 6: 680 mV

b. FREQUENCY SCALE to "1000 Hz"

Deflection on type 1025: 14 dB.
Tolerance: ± 0,2 dB.



4.11. Sensitivity of Acceleration

a. FUNCTION SELECTOR: "Accel."
VEL.GEN.RESPONSE: "Flat"
ACCELERATION RANGE: "1" (Vel.Gen.)
FREQUENCY RANGE: "5-5000 Hz"
FREQUENCY SCALE: "500 Hz"

Adjust the OUTPUT VOLTAGE for an input voltage of exactly 8.36 mV.

Deflection on type 1025: 20 dB.
Tolerance: ± 0,2 dB.

If necessary, adjust P 7 "Accel./V.G."

After adjustment of P 7 check item 4.10.

AC voltage on V 1 pin 1: 340 mV
pin 2: 3,5 mV
pin 6: 29 mV

b. FREQUENCY SCALE to "250 Hz"

Deflection on type 1025: 14 dB.
Tolerance: ± 0,2 dB.

4.12. Check of Acceleration Range

a. FUNCTION SELECTOR: "Accel."
VEL.GEN.RESPONSE: "Flat"
ACCELERATION RANGE: "1" (Vel.Gen.)
FREQUENCY RANGE: "5-5000 Hz"
FREQUENCY SCALE: "500 Hz"

Adjust OUTPUT VOLTAGE to 20 dB deflection on type 1025.

b. ACCELERATION RANGE to "10" (Vel.Gen.)

Deflection on type 1025: 0 dB.

Adjust OUTPUT VOLTAGE to 20 dB deflection on type 1025

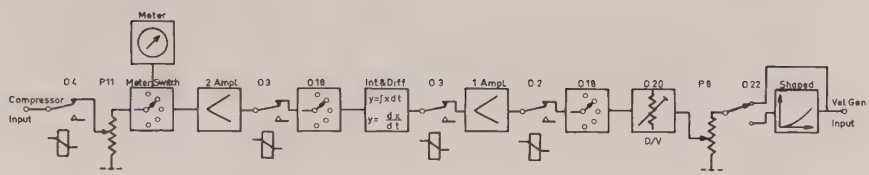
c. ACCELERATION RANGE to "100" (Vel.Gen.)

Deflection on type 1025: 0 dB.

Adjust OUTPUT VOLTAGE to 20 dB deflection on type 1025

d. ACCELERATION RANGE to "1000"(Vel.Gen.)

Deflection on type 1025: 0 dB.



4.13. Check of Displ.-Vel.Range

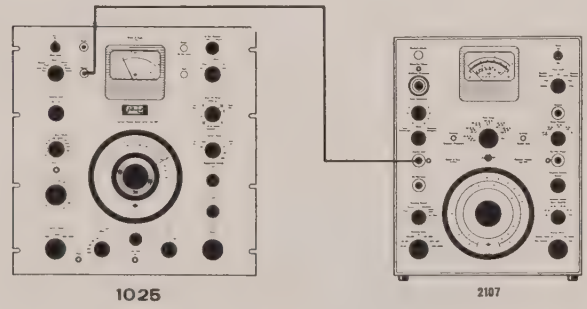
a. FUNCTION SELECTOR: "Displ."
VEL.GEN.RESPONSE: "Flat"
DISPL.-VEL.RANGE: "0,01" (Vel.Gen.)
FREQUENCY RANGE: "5-5000 Hz"
FREQUENCY SCALE: "5 Hz"
— Adjust OUTPUT VOLTAGE to 20 dB deflection on type 1025.

b. DISPL.-VEL.RANGE to "0,1" (Vel.Gen.)
— Deflection on type 1025: 0 dB.
Adjust OUTPUT VOLTAGE to 20 dB deflection on type 1025.

c. DISPL.-VEL.RANGE to "1" (Vel.Gen.)
— Deflection on type 1025: 0 dB.
Adjust OUTPUT VOLTAGE to 20 dB deflection on type 1025.

d. DISPL.-VEL.RANGE to "10" (Vel.Gen.)
— Deflection on type 1025: 0 dB.

e. FUNCTION SELECTOR to "Vel."
— Check Displ.-Vel. Range again at 500 and 2000 Hz.
Check tolerances as under items a–d.



4.14. Noise-Microphony

a. FUNCTION SELECTOR: "Vel."
DISPL.-VEL.RANGE: "0,01" (Vel.Gen.)
— The instrument must be in its case or in other way effectively screened.
Disconnect input signal to both input amplifier "Vel." and "Acc."
Check the microphony by gently tapping on the front plate of the apparatus.
All deflections are read in dB below 10 V.
Velocity with velocity generator.
Noise: 45 dB
Microphony: 30 dB

b. FUNCTION SELECTOR to "Displ."
— Displacement with velocity generator.
Noise: 45 dB
Microphony: 45 dB

c. FUNCTION SELECTOR to "Accel."
— Acceleration with velocity generator.
Noise: 32 dB
Microphony: 25 dB

continued

d. FUNCTION SELECTOR to "Vel." DISPL.-VEL.RANGE: "0,01" (Acc.Gen.)	Velocity with acceleration generator.	Noise: Microphony:	32 dB 25 dB
e. DISPL.-VEL.RANGE to "0,1" (Acc.Gen.)		Noise: Microphony:	45 dB 40 dB
f. FUNCTION SELECTOR to "Displ." DISPL.-VEL.RANGE to "0,01" (Acc.Gen.)	Displacement with acceleration generator.	Noise: Microphony:	45 dB 35 dB
g. FUNCTION SELECTOR to "accel." ACCELERATION RANGE to "1" (Acc.Gen.)	Acceleration with acceleration generator.	Noise: Microphony:	50 dB 30 dB

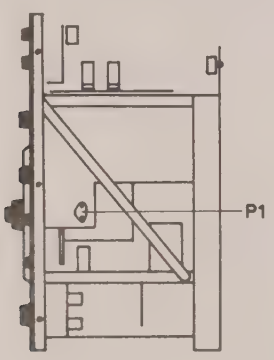
Possible reasons for Noise: Defective tube V 2
Defective capacitor C 15, 16.
Defective relay O 2

Possible reason for Microphony: Defective tube V 1

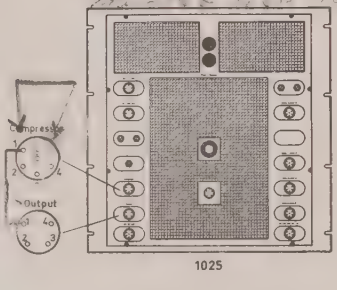
To check this section set the switches as follows:

SCANNING SWITCH: "Off"
OUTPUT SWITCH: "Linear"
VEL.GEN. RESPONSE: "Flat"

Switches not mentioned here are set in a position according to instructions.



right side view



1025

5.1. Compressor Balance

METER SWITCH: "Output Voltage"
FREQUENCY RANGE: "5-5000 Hz"
COMPRESSOR SPEED: "Off"
FREQUENCY SCALE: "400 Hz"

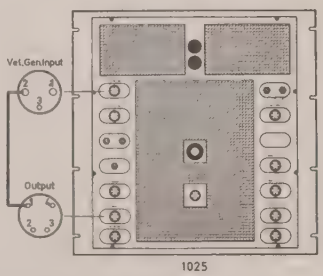
Adjust OUTPUT VOLTAGE for a 1 V deflection on type 1025.

Adjust P 1 until signals on the anodes of V 3 are equal.

V 3 is located on printed circuit XC 0126.

Tolerance: ± 2%.

Possible reasons for fault: Defective diode Q 13
Defective capacitor C 87, 88



1025

5.2. Compression

a. METER SWITCH: "Vibration Level"
FREQUENCY RANGE: "5-5000 Hz"
COMPRESSOR SPEED: "100"
FUNCTION SELECTOR: "Vel."
DISPL.-VEL.RANGE: "0,1" (Vel.Gen.)
OUTPUT VOLTAGE: "10"
FREQUENCY SCALE: "200 Hz"

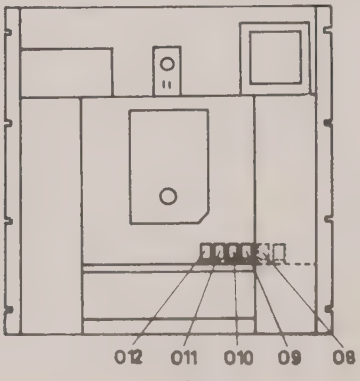
Adjust DISPLACEMENT VELOCITY LEVEL for an 18 dB deflection on type 1025.

b. DISPL.VEL.RANGE to "1" (Vel.Gen.) — Deflection on type 1025: 18 dB. Tolerance: ± o.5 dB.

c. DISPL.VEL.RANGE to "10" (Vel.Gen.) — Deflection on type 1025: 18 dB. Tolerance: ± 1.3 dB.

Distortion < 1%
Output 500 MV RMS

Distortion < 3%
Output 5 watts RMS



rear view

5.3. Compressor Speed.

a. METER SWITCH: "Vibration Level"
FREQUENCY RANGE: "5-5ooo Hz"
COMPRESSOR SPEED: "300"
FUNCTION SELECTOR: "Vel."
DISPL.-VEL.RANGE: "1" (Vel.Gen.)
OUTPUT VOLTAGE: "10"
FREQUENCY SCALE: "500 Hz"

Adjust DISPLACEMENT VELOCITY LEVEL for a 20 dB deflection on type 1025.

By changing DISPL.-VEL. RANGE from "1" to "10", the meter pointer will move against 0 and up again. Read the lowest pointer deflection for all positions of COMPRESSOR SPEED.

COMPRESSOR SPEED:	Deflection read on the meter (approx.):
10	6 dB
30	10 "
100	14 "
300	17 "
1000	18 "
3000	19 "

	Frequency Hz				
	15	50	150	500	1500
	dB deflection read on the meter (approx.)				
Auto 1	6	10	10	10	10
" 2	6	10	14	14	14
" 3	6	10	14	17	17
" 4	6	10	14	17	18
" 5	6	6	10	14	17
" 6	6	6	6	10	14

COMPR. SPEED position

Auto 1: 10 - 30 - 30 - 30 - 30 dB/sec.
2: 10 - 30 - 100 - 100 - 100 dB/sec.
3: 10 - 30 - 100 - 300 - 300 dB/sec.
4: 10 - 30 - 100 - 300 - K000 dB/sec.
5: 10 - 10 - 30 - 100 - 300 dB/sec.
6: 10 - 10 - 10 - 30 - 100 dB/sec.

b. OUTPUT VOLTAGE to "0"

Check that the compressor relays are energized according to the following table.

COMPRESSOR SPEED	Independent of position of FREQUENCY SCALE			
10				
30	08			
100	08-09			
300	08-09-010			
1000	08-09-010-011			
3000	08-09-010-011-012			
	FREQUENCY SCALE Hz			
	30-100	100-300	300-1000	1000-5000
Auto 1	08	08	08	08
" 2	08	08-09	08-09	08-09
" 3	08	08-09	08-09-010	08-09-010
" 4	08	08-09	08-09-010	08-09-010-011
" 5		08	08-09	08-09-010
" 6			08	08-09

5.4. Frequency Response with Velocity Generator.

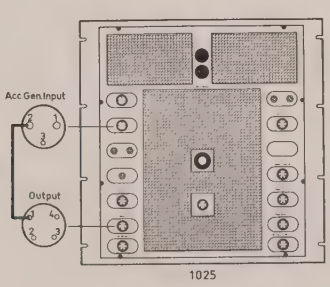
METER SWITCH: "Vibration Level"
COMPRESSOR SPEED: "300"
FUNCTION SELECTOR: "Vel."
DISPL.-VEL.RANGE: "1" (Vel.Gen.)
OUTPUT VOLTAGE: "10"
FREQUENCY RANGE: "5-5ooo Hz"
FREQUENCY SCALE: "500 Hz"

Adjust DISPLACEMENT VELOCITY LEVEL for a 19 dB deflection on type 1025.

Vary the frequency from 5-2ooo Hz.

Deflection on type 1025: 19 dB.
Tolerance: ± o.5 dB.

By turning DISPLACEMENT-VELOCITY LEVEL it should be possible to obtain deflections from -2 dB to 21 dB.



5.5. Frequency Response with Acceleration Generator.

METER SWITCH: "Vibration Level"
FREQUENCY RANGE: "5-5ooo Hz"
COMPRESSOR SPEED: "300"
FUNCTION SELECTOR: "Accel."
ACCELERATION RANGE: "1ooo" (Accel.Gen.)
OUTPUT VOLTAGE: "10"
FREQUENCY SCALE: "1ooo Hz"

Adjust ACCELERATION LEVEL for a 19 dB deflection on type 1025.

Vary the frequency from 10-1ooo Hz. 10 to 1000 Hz

Deflection on type 1025: 19 dB.
Tolerance: ± o.5 dB.

By turning ACCELERATION LEVEL it should be possible to obtain deflections from -2 to 21 dB.

(short 1+5 / 2+3 on Compressor.

continued

5.6. Gain Reserve.

a. METER SWITCH: "Output Voltage"
FREQUENCY RANGE: "5-5ooo Hz"
COMPRESSOR SPEED: "300"
FREQUENCY SCALE: "1ooo Hz"

COMPRESSOR input disconnected

Adjust the OUTPUT VOLTAGE for a 20 dB deflection on type 1025.

b. COMPRESSOR SPEED to "Off"

Deflection on type 1025: Max. 12 dB.

Possible reason for fault: Defective tube V 5.

5.7. Compressor Meter.

METER SWITCH: "Vibration Level Preset"
FREQUENCY RANGE: "5-5000 Hz"
COMPRESSOR SPEED: "3000"
FUNCTION SELECTOR: "Accel."
FREQUENCY SCALE: "500 Hz"

Adjust ACCELERATION LEVEL for a 0 dB deflection on type 1025.

Check that the deflection on the Compressor Meter is 20 dB.

If necessary adjust P 17 (located on printed circuit XC 0349).

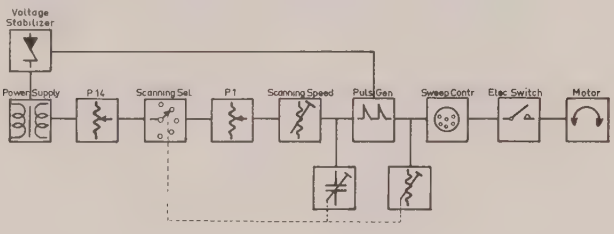
Connect ACCEL. CABLE TO INPUT

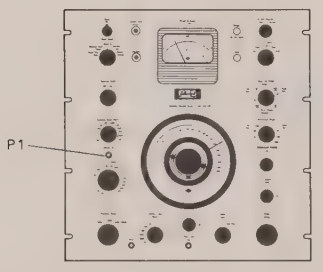
5.8

1-12-70 DWA

Removal of Motor Unit.

Follow instructions for removal of tuning capacitor CV 0009 item 1025.2.





1025

6.1. Adjustment of Motor Speed

a. SCANNING SWITCH: "On"
SCANNING SPEED SELECTOR: "X 1"
SCANNING SPEED: "1,80"

The speed should be 1,80° per min.

Tolerance: ± 3%.

If necessary adjust P 14 (Motor).

The periodic time of the pulses should be 24 m.sec. measured on "Sweep Control B" pin 6.

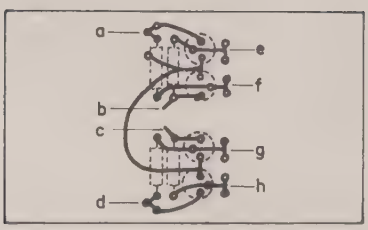
b. SCANNING SPEED SELECTOR to "2,59"

The speed should be 2,59° per min.

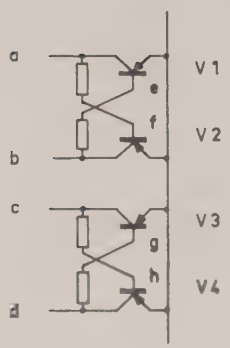
If necessary adjust potentiometer P 1.

The periodic time of the pulses should be 16,67 m.sec.

continued



Printed circuit XC 0130



6.2. Fault Tracing for Motor Unit.

a. SCANNING SWITCH: "Off"
SCANNING SPEED SELECTOR: "1"
SCANNING SPEED: "1.80"

If the motor does not work, check the 24 m.sec. pulses on SWEEP CONTROL B socket (pin 6) in order to localize the defect to be in the pulse generator or in motor unit.

If the pulses are present on SWEEP CONTROL B socket check the dc voltages on the transistors in the multivibrator.

Measuring Point	a	b	c	d	e	f	g	h	
DC Voltage	- 10 V	- 10 V	- 10 V	- 10 V					The two multivibrations are working
	0 V	- 20 V	- 20 V	0 V	- o,5 V	+ 2 V	+ 2 V	- o,5 V	Transistor V 1 should change over.
	- 20 V	0 V	0 V	- 20 V	+ 2 V	- o,5 V	- o,5 V	+ 2 V	Transistor V 2 should change over.
	0 V	- 20 V	0 V	- 20 V	- o,5 V	+ 2 V	- o,5 V	+ 2 V	Transistor V 3 should change over.
	- 20 V	0 V	- 20 V	0 V	+ 2 V	- o,5 V	+ 2 V	- o,5 V	Transistor V 4 should change over.

Connect an oscilloscope to the collector of the transistor which should change over according to the table.

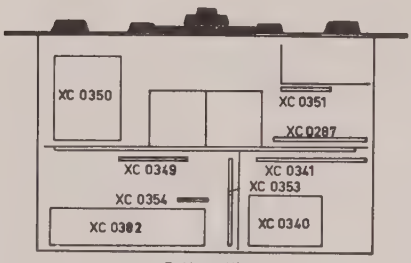
a. The pulses can not be obtained on the collector but the pulses are on the base. This transistor or accompanying components may be defective.

b. The pulses can be obtained on the collector. The transistor with which it is matched is defective.

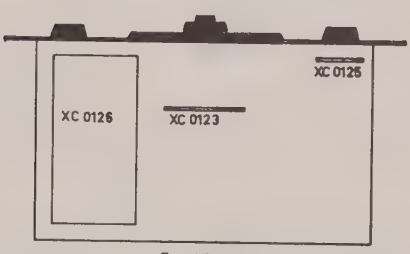
Position of Components

valid from serial no. 185806

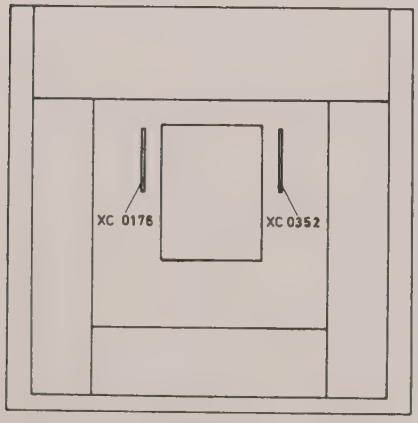
Position of Printed Circuits



Bottom View

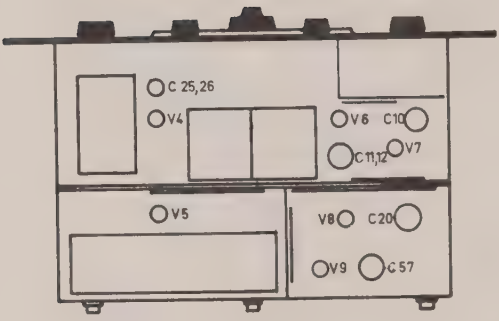


Top View

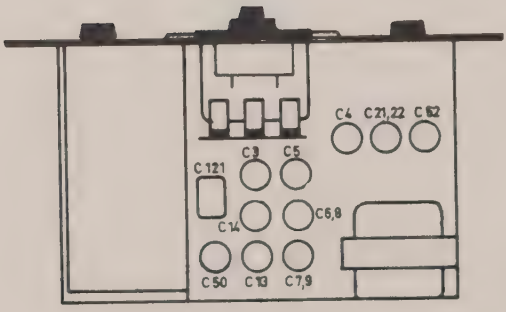


Rear View

Position on Electrolytic Capacitors



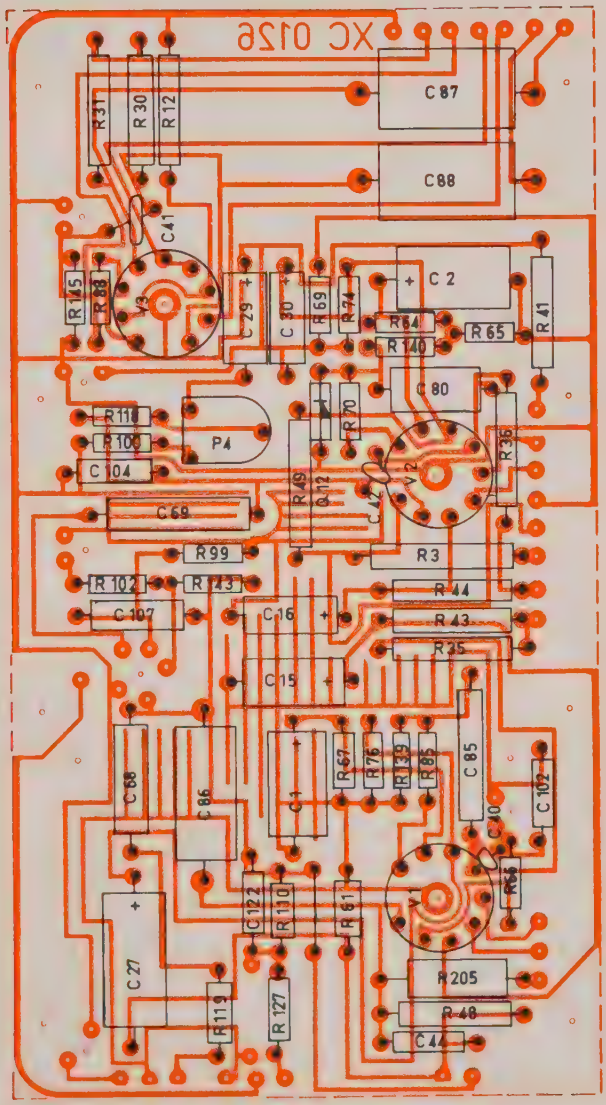
bottom view



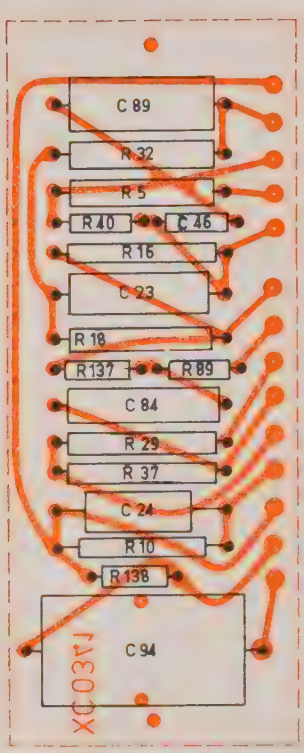
top view

Compressor

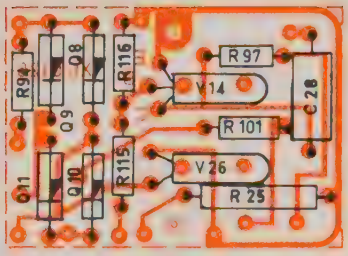
Pick-up
Amplifier



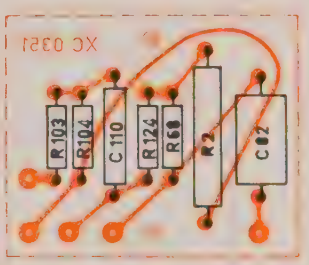
XC 0126



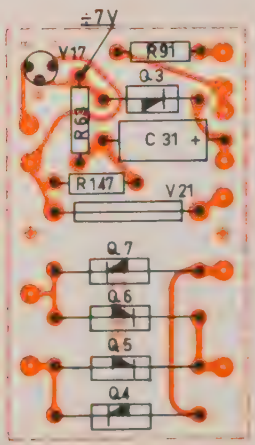
Output Amplifier
XC 0341



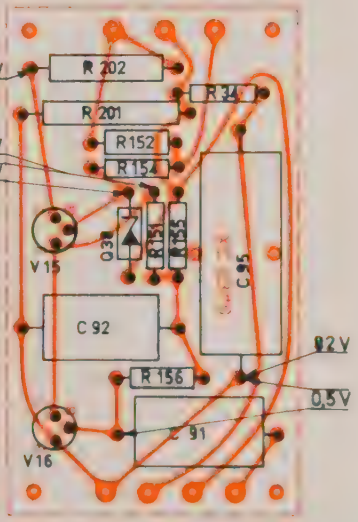
Meter Circuit
XC 0125



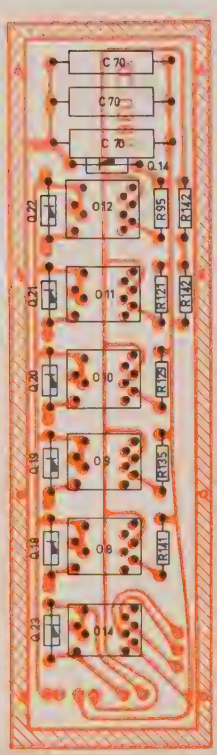
Variable Oscillator
XC 0351



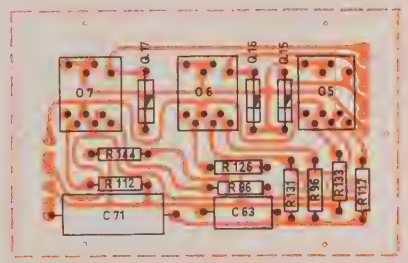
Low Voltage Supply
XC 0352



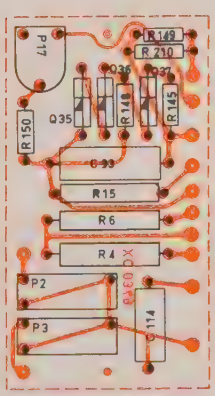
Emitter Follower
XC 0340



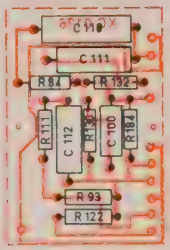
Compressor Relays
XC 0382



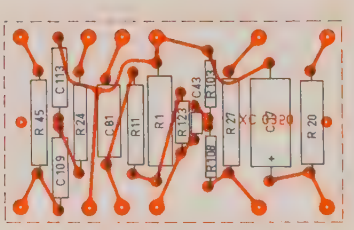
Differentiating and Integration Circuits
XC 0123



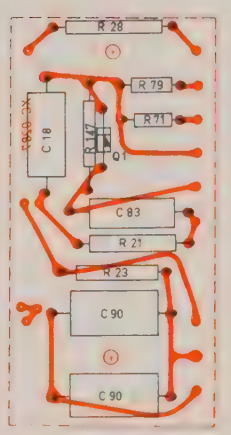
Compressor Meter
XC 0349



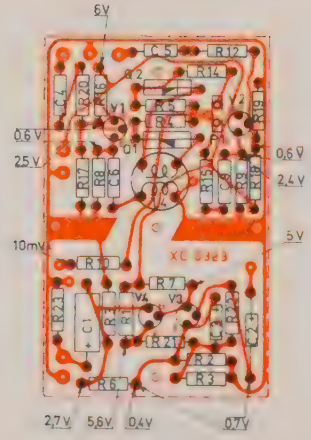
Vel. Gen. Input
XC 0176



Fixed Oscillator
XC 0350

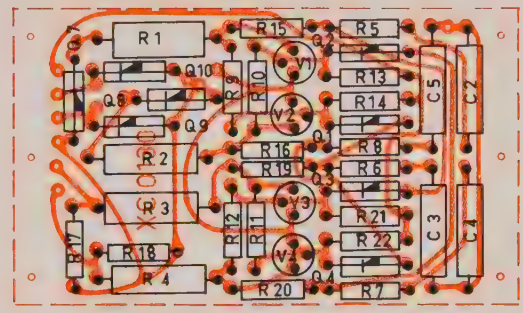


Mixer Circuit
XC 0287

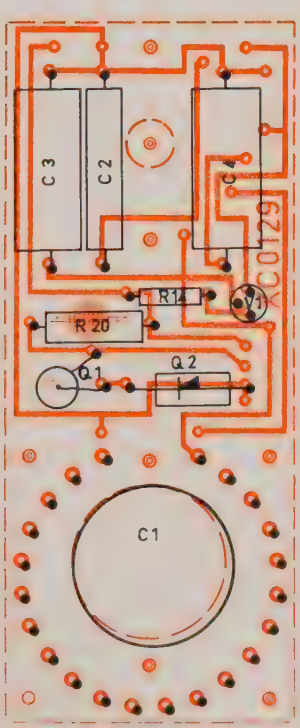


Constant Level Output
XC 0353

Constant Level Output Filter
XC 0354



Motor Circuit
XC 0130



Scanning Speed
XC 0129

CAPACITORS:

CIRCUIT DIAGRAM REF.	COMPONENT TYPE		STOCK REF.
C 1,2	Electrolytic	640 µF/ 16 V	CE 0209
C 3	"	5000 µF/ 15 V	CE 0301
C 4,5	"	1000 µF/ 75 V	CE 0501
C 6-12	"	2 x 100 µF/250 V	CE 0707
C 13	"	2 x 100 µF/450 V	CE 0902
C 14	"	50 µF/500 V	CE 0903
C 15	"	4 µF/350 V	CE 0708
C 16	"	4 µF/250 V	CE 2034
C 17,18	"	40 µF/150 V	CE 2038
C 21,22	"	2 x 100 µF/450 V	CE 0902
C 23,24	"	100 µF/250 V	CE 0415
C 25,26	"	2 x 25 µF/450 V	CE 0911
C 27	"	1000 µF/ 16 V	CE 0309
C 28	"	50 µF/ 25 V	CE 8965
C 29,30,31	"	100 µF/ 15 V	CE 0310
C 32	"	50 µF/500 V	CE 0913
C 40	Ceramic	1.8 pF/500 V	CK 0180
C 41	"	3.3 pF/500 V	CK 0330
C 42	"	10 pF/500 V	CK 1100
C 43	"	18 pF/500 V	CK 1180
C 44,46	"	27 pF/500 V	CK 1270
C 50	Paper	3.5 µF/200 V	CP 0342
C 52	"	8 µF/150 V	CP 0888
C 60	Polyester	10 nF/125 V	CS 0001
C 61	"	0.1 µF/250 V	CS 0013
C 63	"	0.15 µF/250 V	CS 0015
C 64	"	0.33 µF/250 V	CS 0019
C 65	"	0.47 µF/250 V	CS 0021
C 66,67	"	0.68 µF/250 V	CS 0023
C 68-70	"	0.47 µF/250 V	CS 0021
C 70,71	"	1 µF/250 V	CS 0025
C 72	"	10 nF/125 V	CS 0001
C 73	"	47 nF/250 V	CS 0009
C 80	"	47 nF/400 V	CS 0109
C 81-84	"	0.1 µF/250 V	CS 0013
C 85	"	0.22 µF/400 V	CS 0117
C 86	"	1 µF/250 V	CS 0025
C 87,88	"	1 µF/350 V	CS 0500
C 89-92	"	2 µF/250 V	CS 0028
C 93	"	1 µF/250 V	CS 0025
C 94,95	"	10 µF/160 V	CS 0722
C 100	Polystyrene	75 pF/500 V	CT 0102
C 102,103	"	200 pF/500 V	CT 0107
C 104	"	300 pF/500 V	CT 0109
C 105	"	400 pF/500 V	CT 0111
C 106	"	450 pF/500 V	CT 0112
C 107-110	"	500 pF/500 V	CT 0113
C 111	"	1 nF/400 V	CT 0218
C 112	"	400 nF/500 V	CT 0111
C 113	"	1 nF/400 V	CT 0218
C 114	"	6.3 nF/200 V	CT 3234
C 115	" ±1%	10 nF/200 V	CT 3331
C 116	" "	100 nF/100 V	CT 3359
C 117	" "	1 µF/100 V	CT 3345
C 118,119	" "	1.25 nF/400 V	CT 1302
C 120	" "	200 nF/100 V	CT 3362
C 121	" "	2 µF/100 V	CT 5041
C 122	" "	175 pF/500 V	CT 0106
C 123	"	400 pF/500 V	CT 0111
C 130	Variable Tuning Capacitor		CV 0009
C 131	Trimmer	60 pF	CV 3007
C 132	"	15 pF	CV 3013
C 133	"	1.5-3.5 pF	CV 0021

RESISTORS:

CIRCUIT DIAGRAM REF.	COMPONENT TYPE				STOCK REF.
R 1,2	Carbon	1 W	10%	10 kΩ	
R 3-5	"	"	"	20 kΩ	
R 6	"	"	"	31.5 kΩ	
R 10	"	1/2 W	"	160 Ω	
R 11	"	"	"	500 Ω	
R 12,13	"	"	"	1 kΩ	
R 14	"	"	2%	1.6 kΩ	
R 15	"	"	10%	2 kΩ	
R 16,17	"	"	5%	3.15 kΩ	
R 18	"	"	"	6.3 kΩ	
R 19	"	"	"	20 kΩ	
R 20-23	"	"	10%	31.5 kΩ	
R 24,25	"	"	5%	50 kΩ	
R 26	"	"	10%	63 kΩ	
R 27,28	"	"	"	80 kΩ	
R 29	"	"	"	100 kΩ	
R 30-32	"	"	5%	100 kΩ	
R 33,34	"	"	10%	200 kΩ	
R 35-37	"	"	"	315 kΩ	
R 38,39	"	"	5%	350 kΩ	
R 40	"	"	10%	500 kΩ	
R 41	"	"	2%	500 kΩ	
R 42	"	"	10%	630 kΩ	
R 43,44	"	"	"	800 kΩ	
R 45	"	"	"	1 MΩ	
R 46	"	"	5%	1.25 MΩ	
R 47	"	"	10%	1.6 MΩ	
R 48,49	"	"	"	2 MΩ	
R 60	"	1/3 W	"	10 Ω	
R 61	"	"	2%	100 Ω	
R 63	"	"	10%	80 Ω	
R 64,65	"	"	"	315 Ω	
R 66-68	"	"	"	500 Ω	
R 69	"	"	2%	600 Ω	
R 70	"	"	10%	1 kΩ	
R 71	"	"	2%	1.5 kΩ	
R 72-75	"	"	10%	2 kΩ	
R 76	"	"	"	2.5 kΩ	
R 77,78	"	"	"	3.15 kΩ	
R 79,80	"	"	"	4 kΩ	
R 81	"	"	"	5 kΩ	
R 82,83	"	"	"	6.3 kΩ	
R 84	"	"	2%	10 kΩ	
R 85-89,91	"	"	10%	10 kΩ	
R 92	"	"	2%	20 kΩ	
R 93,94	"	"	"	31.5 kΩ	
R 95	"	"	5%	31.5 kΩ	
R 96,97	"	"	10%	31.5 kΩ	
R 98-100	"	"	2%	40 kΩ	
R 101	"	"	10%	40 kΩ	
R 102-104	"	"	2%	63 kΩ	
R 105	"	"	10%	63 kΩ	
R 106	"	"	5%	70 kΩ	
R 107-109	"	"	2%	100 kΩ	
R 110	"	"	5%	100 kΩ	
R 111-116	"	"	10%	100 kΩ	
R 117,118	"	"	"	150 kΩ	
R 119	"	"	5%	160 kΩ	
R 120	"	"	2%	175 kΩ	
R 121	"	"	5%	180 kΩ	
R 122	"	"	2%	200 kΩ	
R 123,124	"	"	10%	200 kΩ	
R 125	"	"	5%	315 kΩ	
R 126	"	"	10%	315 kΩ	
R 127,128	"	"	5%	500 kΩ	
R 129	"	"	"	600 kΩ	
R 130	"	"	2%	1 MΩ	

continued

CIRCUIT DIAGRAM REF.	COMPONENT TYPE				STOCK REF.
RESISTORS:					
R 131	Carbon	1/3 W	5%	630 kΩ	
R 132	"	"	2%	1 MΩ	
R 133,134	"	"	10%	1 MΩ	
R 135	"	"	5%	1.8 MΩ	
R 137,138	"	"	10%	2 MΩ	
R 139,140	"	"	"	3.15 MΩ	
R 141,142	"	"	5%	6 MΩ	
R 143,144	"	"	10%	6.3 MΩ	
R 145	"	"	"	1 MΩ	
R 146	"	"	5%	20 Ω	
R 147	"	"	10%	80 Ω	
R 148,149	"	"	5%	16 kΩ	
R 150	"	"	10%	20 kΩ	
R 151	"	"	5%	55 kΩ	
R 153	"	"	10%	63 kΩ	
R 154	"	"	"	80 kΩ	
R 155,156	"	"	5%	110 kΩ	
R 157	"	"	2%	40 kΩ	
R 160-162	"	"	0.5%	111.1 Ω	
R 163	"	"	"	222.2 Ω	
R 164-166	"	"	0.5 %	1 kΩ	
R 167	"	"	"	2 kΩ	
R 168	"	"	"	222.2 kΩ	
R 169-171	"	"	"	10 kΩ	
R 172,173	"	"	"	20 kΩ	
R 174-176	"	"	"	100 kΩ	
R 177,178	"	"	"	200 kΩ	
R 179	"	"	"	11.11 kΩ	
R 180	"	"	"	100 kΩ	
R 181	"	"	"	980 kΩ	
R 182,183	"	"	"	1 MΩ	
R 184	"	"	"	143 kΩ	
R 185	"	"	1%	160 kΩ	
R 186	"	"	"	315 kΩ	
R 187	"	1/2 W	"	700 kΩ	
R 200	Wire	10 W	"	10 kΩ	RO 0210
R 201	"	8 W	"	10 kΩ	RX 0403
R 202	"	5 W	"	15 kΩ	RX 0304
R 203	"	10 W	"	82 Ω	RX 0107
R 204	"	"	"	100 Ω	RX 0108
R 205	"	5.5 W	"	13 kΩ	RX 0308
R 206	"	8 W	"	390 Ω	RX 0406
R 210	NTC	1.8 W		15 kΩ	RN 0003

POTENTIOMETERS:				
P 1	Trimmer	lin.	10 kΩ	PG 3100
P 2,3	"	"	10 kΩ	PG 3104
P 4	"	"	10 kΩ	PG 3102
P 5	Accel. Level	log.	50 kΩ	PP 3507
P 6	Vel. /V.G.	lin.	50 kΩ	PP 3504
P 7	Acc. /V.G.	"	100 kΩ	PP 4102
P 8	Displ./V.G.	"	100 kΩ	PP 4102
P 9	Vel. /A.G.	"	100 kΩ	PP 4102
P 10	Displ./A.G.	"	100 kΩ	PP 4102
P 11	Displ.-Vel. Level	log.	500 kΩ	PP 4504
P 12	Phase	"	10 kΩ	PP 3106
P 13	Accel/A.G.	lin.	10 kΩ	PQ 3100
P 14	Motor	"	20 kΩ	PQ 3200
P 15	Meter	"	20 kΩ	PQ 3200
P 16	Output Voltage	"	100 kΩ	PS 4100
P 17	Trimmer	"	22 kΩ	PG 3201
	Pilot Voltage	"	10 kΩ	ZR 0011

SWITCHES - RELAYS:		
N 1	Power On-Off	NN 0563
O 1	Power Voltage Selector	OA 0017
O 2-14	Relay	OC 0006
O 15	Relay	OC 0020
O 16	Frequency Range	OP 1025
O 17	Compressor Speed	OQ 1025
O 18	Function Selector	OS 1028
O 19	Operation Switch	OT 1041
O 20	Displ.-Vel. Range	ON 1028
O 21	Acceleration Range	ON 1028
O 22	Vel. Gen. Response	OX 1016
O 23	Meter Switch	OX 1025
O 24	Output Switch	OZ 1025

CIRCUIT DIAGRAM REF.	COMPONENT TYPE			STOCK REF.
RECTIFIERS:				
Q 1-3	Silicon	200 V/0.04	A	QV 0022
Q 4-7	"	1200 V/0.15	A	QV 0025
Q 8-11	Germanium	115 V/0.15	A	QV 0085
Q 12-14	Silicon	1000 V/0.15	A	QV 0025
Q 15-23	"	50 V/0.75	A	QV 0501
Q 24-27	"	200 V/ 0.6	A	QV 0502
Q 28-31	"	65 V/ 0.6	A	QV 1003
Q 32	Zener	6.5 V/0.14	A	QV 1309
Q 33-37	Silicon	50 V/0.74	A	QV 0501
Q 38	Zener	150 V/ 5 mA		QV 1317

TRANSISTORS - TUBES:				
V 1	Triode, pentode	ECF80/68L8		VA 0061
V 2	"	ECF82/6U8		VA 0062
V 3	Twin triode	ECC83/12AX7		VA 0012
V 4	"	ECC81/12AT7		VA 0009
V 5	Pentode	EF94/6AU6		VA 0035
V 6-8	Twin triode	ECC81/12AT7		VA 0009
V 10	"	EL86/6CW5		VA 0024
V 11	"	EF94/6AU6		VA 0035
V 12	Stabilizer	OA2		VA 0039
V 13	Germ. transistor	TI3028		VB 0029
V 14	"	OC44		VB 3044
V 15,16	Silicon Transistor	2N3440		VB 0250
V 17	Germ. transistor	2N2374		VB 2022
V 20	Fuse	1.6 A		VF 0007
V 21	Fuse	2.5 A		VF 0011
V 22	Meter Lamp	6.3 V/0.5 A		VS 1271
V 23,24	Accel.ind.lamp	6.3 V/0.15 A		VS 8008
V 25	Dial Lamp	6.3 V/ 0.3 A		VS 8024
V 26	Cold Cathodetube	90 V		VA 0072

PRINTED CIRCUIT:		
	Diff. and Integr. Circuit	XC 0123
	Meter Circuit	XC 0125
	Compressor, Pick-up Amplifier	XC 0126
	Vel. Gen. Input	XC 0176
	Mixer Circuit	XC 0287
	Emitter Follower	XC 0340
	Output Amplifier	XC 0341
	Var. μ Amplifier	XC 0349
	Fixed Oscillator	XC 0350
	Variable Oscillator	XC 0351
	Rectifier Circuit	XC 0352
	Constant Level Output	XC 0353
	Constant Level Output Filters	XC 0354
	Compressor Relays	XC 0382
	XC 0123 with components	8051019
	XC 0125 "	8011019
	XC 0126 "	8041019
	XC 0176 "	8091019
	XC 0287 "	8161025
	XC 0340 "	8131025
	XC 0341 "	8121025
	XC 0349 "	8141025
	XC 0350 "	8151025
	XC 0351 "	8251025
	XC 0352 "	8071025
	XC 0353 "	
	XC 0354 "	8000111
	XC 0382 "	8061025

CIRCUIT DIAGRAM REF.	COMPONENT TYPE	STOCK REF.
MISCELLANEOUS:		
	Bakelite knob 25 mm	SN 0701
	" 30 mm x 17	SN 0814
	" 30 mm x 11	SN 0807
	" 35 mm	SN 0989
	" 55 mm	SN 1014
L 1	Choke	LJ 0003
Z 2	Coils for Oscillator	ZS 0081
Z 3	Coils for compressor	ZS 0100
	Coils for magnet clutch	LB 1011
	Cabinet, wood	KA 1018
	Cabinet, metal	KQ 0048
Z 5	Constant Level circuit	ZE 0012
	Frequency dial	SA 1004
	Housing for freq. dial	SO 0189
Z 4	Low-pass filter	ZS 0110
	Magnet clutch	UM 1008
I 2	Moving coil meter	IM 1025
I 4	"	IM 1028
	Magnet clutch	UM 1009
	Plug 3 pin	JP 0304
	Plug 4 pin	JP 1004
	Plug 6 pin	JP 1005
	Plug 20 pin	JP 2000
	Plug, Vibration/Oscillator	JP 0009
	Pointer for freq. dial	SV 0018
	Power cord. EUR	AN 0005
	Power cord. USA	AN 0006
T 1	Power transformer	TN 0015
	Socket 3 pin	JJ 0304
	Socket 4 pin	JJ 1004
	Socket 6 pin	JJ 1005
	Socket 7 pin	JJ 0700
	Socket 20 pin	JJ 2000
	Socket Vibration/Oscillator	JJ 1006
	Socket Fuse V 20,21	JS 0006
	Socket Transistor	JS 0009
	Socket Tube V 5, 11, 12	JV 7503
	Socket Tube V 4, 6-10	JV 9011
	Socket Tube V 1-3	JV 9012
	Socket Relay O 2, 5-14	JJ 0012
	Socket Relay O 3, 4, 30	JJ 0008

Pulsegenerator ZI 0001

CIRCUIT DIAGRAM REF.	COMPONENT TYPE				STOCK REF.
CAPACITORS:					
C 1	Polystyrene		+0,-2%	1 µF/100 V	CT 3345
C 2	"		"	50 nF/100 V	CT 3355
C 3	"		"	150 nF/100 V	CT 3356
C 4	"		"	300 nF/100 V	CT 3357
RESISTORS:					
R 1	Metal	1/2 W	10%	510 kΩ	RF 0100
R 11	Carbon	1/3 W	2.5%	30,2 Ω	
R 12	"	"	"	39,8 Ω	
R 13	"	"	"	60,3 Ω	
R 14	"	"	"	800 Ω	
R 16	"	"	o.5%	64,6 kΩ	
R 17	"	"	"	501 kΩ	
R 20	Wire	5.5 W	10%	6,8 kΩ	RX 0305
R 21	Carbon	1/3 W	o.5%	94,4 kΩ	
R 22	"	"	"	85,1 kΩ	
R 23	"	"	"	75,9 kΩ	
R 24	"	"	"	79,4 kΩ	
R 25	"	"	"	70,8 kΩ	
R 26	"	"	"	73,3 kΩ	
R 27	"	"	"	79,4 kΩ	
R 28	"	"	"	69,2 kΩ	
R 29	"	"	"	61,7 kΩ	
R 30	"	"	"	55 kΩ	
R 31	"	"	"	49 kΩ	
R 32	"	"	"	43,2 kΩ	
R 33	"	"	"	47,3 kΩ	
R 34	"	"	"	42,2 kΩ	
R 35	"	"	"	38 kΩ	
R 36	"	"	"	39,4 kΩ	
R 37	"	"	"	38 kΩ	
R 38	"	"	"	33,9 kΩ	
R 39	"	"	"	39,8 kΩ	
R 40	"	"	"	26,6 kΩ	
R 41	"	"	"	31,6 kΩ	
POTENTIOMETER:					
P 1	Carbon, lin			100 kΩ	PP 4108
SWITCHES:					
O 1	Scanning Speed Selector				OV 1040
O 2	Scanning Speed				OY 1040
RECTIFIERS:					
Q 1	Zener			7 V/140 mA	QV 1309
Q 2	Zener			19,5 V/ 70 mA	QV 1310
TRANSISTORS:					
V 1	Germanium			2N1671B	VB 0016
V 2	Germanium			ASZ16	VB 0029
PRINTED CIRCUIT:					
	Scanning Speed				XC 0129
	XC 0129 with components				8000056

continued

CIRCUIT DIAGRAM REF.	COMPONENT TYPE				STOCK REF.

Constant Level Output ZE 0012

CAPACITORS:

C 1	Electrolytic			200 µF/6,4 V	CE 0208
C 2	"			2 µF/ 70 V	CE 0401
C 3	"			8 µF/ 40 V	CE 0414
C 4-6	Polyester			10 µF/250 V	CS 0001
C 7	Polystyrene			600 pF/500 V	CT 0114
C 8	"			500 pF/500 V	CT 0213
C 9	"			400 pF/125 V	CT 1011
C 10-11	"			1.25 nF/500 V	CT 3219

RESISTORS:

R 1	Carbon	1/3 W	10%	180 Ω	
R 2	"	"	"	500 Ω	
R 3	"	"	5%	1 kΩ	
R 4	"	"	2%	4 kΩ	
R 5	"	"	5%	4,5 kΩ	
R 6	"	"	"	5 kΩ	
R 7	"	"	2%	4 kΩ	
R 8,9	"	"	10%	5 kΩ	
R 10	"	"	5%	5 kΩ	
R 11,12	"	"	"	20 kΩ	
R 13	"	"	10%	20 kΩ	
R 14	"	"	5%	10 kΩ	
R 15	"	"	2%	30 kΩ	
R 16	"	"	10%	70 kΩ	
R 17-19	"	"	"	31,6 kΩ	
R 20	"	"	5%	20 kΩ	
R 21,22	"	"	10%	70 kΩ	
R 23	"	"	"	200 kΩ	

POTENTIOMETERS:

P 1	Carbon, lin	25 kΩ	PG 3250

SEMICONDUCTORS:

Q 1,2	Germanium diode	115 V/150 mV	QV 0085
V 1-3	Silicon Transistor	2N3702	VB 1043
V 4	"	BC 107	VB 1032

COILS:

L 1	Low Pass Filter	LB 0567
L 2	"	LB 0567
L 3	"	LB 0602
L 4	Balanced Modulator	LB 0603

CIRCUIT DIAGRAM REF.	COMPONENT TYPE				STOCK REF.

Motor Circuit CV 0009

CAPACITORS:

C 1	Polyester			10 nF/125 V	CS 0001
C 2-5	"			33 nF/125 V	CS 0007

RESISTORS:

R 1-4	Wire	5,5 W	5%	120 Ω	RX 0307
R 5-8	Carbon	1/3 W	"	56 Ω	
R 9-12	"	"	"	3 kΩ	
R 13-22	"	"	"	16 kΩ	

SWITCHES:

O 1	Relay	OD 0006
O 2	Stabilizing Network	OY 1029
O 3	Reversing Arm	NT 0007

SEMICONDUCTORS:

Q 1-4	Germanium diode		115 V/150 mA	QV 0085
Q 5-11	Silicon	"	50 V/750 mA	QV 0501
Q 12	Zener	"	21 V/ 70 mA	QV 1314
V 1-4	Germanium transistor		ACY20	VB 0017

PRINTED CIRCUIT:

	Motor Circuit	XC 0130
	XC 0130 with components	8000054

MOTOR:

M 1	Motor	AU 5050/22	UM 0008
	Gearbox	AU 5300/83 AA	UG 0032